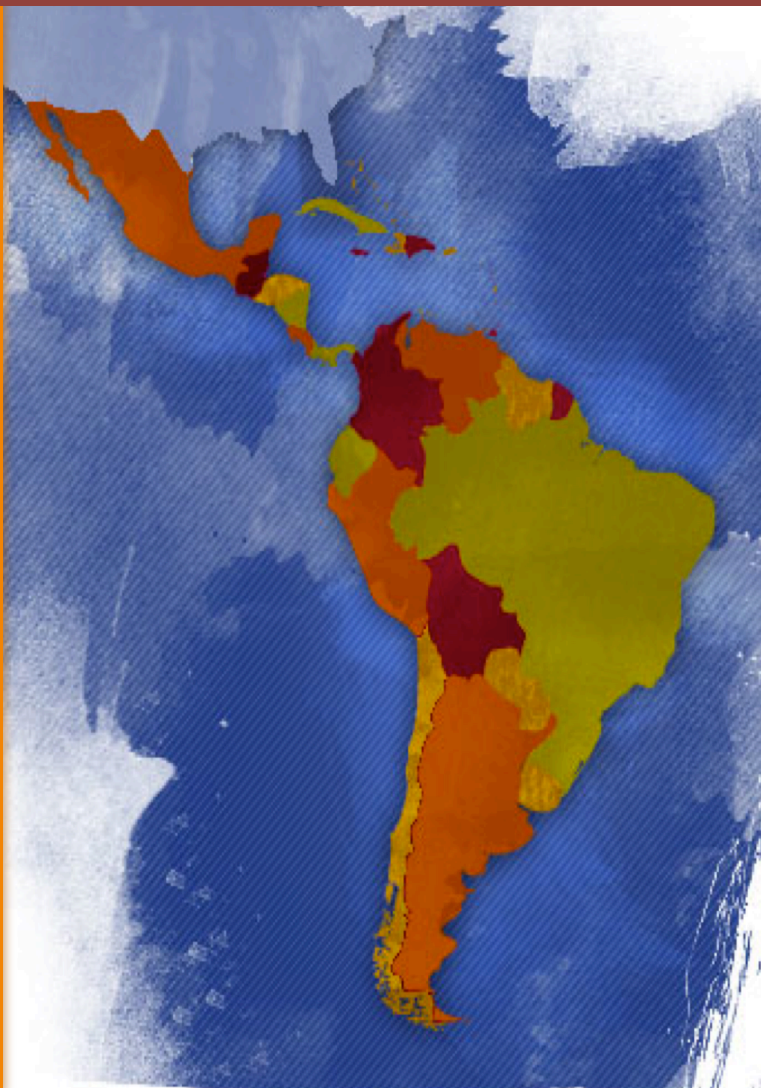


# **U.S.-LATIN AMERICAN NUCLEAR RELATIONS:**

## **FROM COMMITMENT TO DEFIANCE**

Arturo Sotomayor  
*Naval Postgraduate School*



September 2012

**U.S. NAVAL POSTGRADUATE SCHOOL • CENTER ON CONTEMPORARY CONFLICT**

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# **U.S.-Latin American Nuclear Relations: From Commitment to Defiance**

Dr. Arturo Sotomayor  
*Naval Postgraduate School*

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For further information, please contact:

**The Center on Contemporary Conflict**

Naval Postgraduate School  
1411 Cunningham Road  
Monterey, CA 93943

[ccc@nps.edu](mailto:ccc@nps.edu)

or

[OSRDInfo@dtra.mil](mailto:OSRDInfo@dtra.mil)

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## INTRODUCTION AND OVERVIEW

Latin America is once again playing an active role in economic and world affairs. This recent activism is taking place after the region experienced decades of stagnant growth, financial chaos, and political instability. To date, Latin American countries are experiencing robust economic growth, spurred mostly by a strong Asian demand for commodities and the rapid expansion of middle classes across the region.<sup>1</sup> In this context, there is a general recognition that nuclear power will likely play an important role in Latin America. Already, three states have nuclear plants within their territories—Argentina, Brazil, and Mexico—and they are reconsidering an expansion of their nuclear energy capacity. Likewise, countries such as Chile, Peru, Uruguay, and Venezuela have expressed increased interest in nuclear power generation as they have limited or finite indigenous energy resources to sustain their growth. In view of the possible greater need for nuclear power in the Western Hemisphere, this project focuses on an analysis of U.S.-Latin American nuclear cooperation. How do Latin American states cooperate with U.S. nonproliferation efforts? What issue-areas create sources of tension and which ones promote increased nuclear cooperation? What challenges do Latin America states face? How does the region's increased interest in nuclear power challenge U.S. security interests?

Latin America has key advantages vis-à-vis other regions, such as the Middle East or Southeast Asia. In fact, it is a *de jure* denuclearized region as countries have thus far abandoned nuclear weapons programs and are full members of the nonproliferation regime.<sup>2</sup> Likewise, Latin America is the first region to have established a full and wide nuclear-weapon-free zone, known as the Treaty of Tlatelolco, which stretches from Mexico to Tierra del Fuego. Currently, with the exception of Argentina, all Latin American states with nuclear plants and nuclear research reactors have converted to low enriched uranium (LEU) and are now free of weapons-usable nuclear materials.<sup>3</sup>

Still, even without nuclear weapons or aspirations to build them, there are important regional risks that cannot be overlooked. Latin American states differ from each other in terms of their willingness to cooperate with the U.S. and the international community on several grounds. Since the 1970s, Argentina and Brazil have distanced themselves from Washington and even developed militarized nuclear capabilities. These two countries joined the nonproliferation regime after their transitions to democracy in the 1990s, but they did so with strong reservations. They criticized the discretionary nature of the regime and opposed the International Atomic Energy Agency's (IAEA) Additional Protocol. Brazil denied access to its nuclear reactors to IAEA inspectors in 2004, and then re-instated a military plan to develop nuclear-propelled submarines. By contrast, Chile and Mexico made commitments to the U.S. to secure vulnerable nuclear materials and prevent acts of nuclear terrorism in 2010, while fully complying with the Additional Protocol. Moreover, they implemented domestic legislation to increase the levels of

nuclear transparency and accountability by relying extensively on technical and scientific assistance from the IAEA. Hence, policy variations characterize Latin American nuclear energy policies, ranging from full cooperation to defiance.

Not only are there substantial policy differences among countries, but materials from nuclear facilities across the region are inadequately secured against diversion or theft. The management of radioactive waste across the region is also deficient. The six operating nuclear plants in Latin America are at least three decades old and require future updates.

Latin America's renewed interest in nuclear energy thus presents challenges to the "new nuclear age." The latter is a term used to characterize a milieu dominated by nuclear anxiety about horizontal nuclear proliferation in Iran and North Korea, the desire to prevent nuclear terrorism (post-9/11), and the need to avert future nuclear accidents (post-Fukushima Daichi incident).<sup>4</sup> This project report focuses on four Latin American countries (Argentina, Brazil, Chile, and Mexico) and highlights two important findings. First, the U.S. has sought to diminish the appeal of nuclear weapons by relying on a plethora of strategies, involving unilateral, bilateral, and multilateral instruments (dialogues, treaties, and regimes); softer measures (norms, economic incentives, and rewards); and coercive means (sanctions and direct pressures).<sup>5</sup> Interestingly enough, Latin America has reacted in different ways to these strategies. Bilateral, unilateral, and even coercive means have been historically ineffective at dissuading Latin American states from changing or adjusting their nuclear policies. Argentina and Brazil, specifically, have not been particularly responsive to U.S. bilateral pressures. By contrast, the most successful efforts at achieving nuclear cooperation with Chile and Mexico have been dealt mostly by relying on multilateral strategies, involving technical and scientific assistance from the IAEA. Hence, multilateralism is most effective at persuading Latin American states to comply with nonproliferation norms. This seems ironic since the Western Hemisphere is the area where the U.S. exerts the most influence; however, sovereignty and domestic intervention concerns in Latin America indicate that Washington must cautiously approach its regional counterparts without appearing too intrusive or demanding. Multilateralism accomplishes this by diffusing sovereignty concerns, allowing international legitimate and recognized bodies to implement agreements, while providing Latin American states with a forum in which they can express their views and engage in global affairs.

Second, the incentives for greater nuclear cooperation in Latin America are mostly determined by domestic factors, and will remain beyond the sphere of direct U.S. influence. This is another area where the region is uniquely distinct from other areas or zones, such as the Middle East and South Asia, where the U.S. has a large security role and affects regional balances. By contrast, geopolitical factors and security concerns have little consequences in



shaping Latin American nuclear policies. Instead, the nature of economic regimes, civil-military relations, and domestic politics are the most relevant factors affecting Latin America's nuclear preferences.

The report first presents the project research design and methods. The second and third sections discuss the background leading to Latin America's increased interest in nuclear power and the efforts undertaken to denuclearize the region. Section four examines the main security challenges and the sources of tension for U.S.-Latin American relations. Section five examines the areas of increased regional cooperation, with a special focus on Chile and Mexico. The final section summarizes the project's findings and identifies avenues for future research.

## **PROJECT METHODOLOGY**

To analyze U.S.-Latin American nuclear relations, this report will employ a regional, qualitative-oriented approach and apply it to a controlled comparison between the nuclear experiences of Argentina, Brazil, Chile, and Mexico. The selection of these particular cases is not arbitrary. Indeed, a focused comparison offers methodological advantages with which to improve our understanding of why states cooperate with or defy U.S. nonproliferation efforts.

For example, all cases have similar background conditions but show different outcomes, thus approximating a most-similar case study research design. Consider Argentina, Brazil, and Mexico; all are recognized regional powers with relatively similar capabilities, including access to economic resources, raw materials, technology and infrastructure. These three countries have a virtual monopoly over the production of nuclear energy in Latin America, as they are the only states in the region to have successfully developed nuclear energy plants. Each of these three countries possesses two nuclear reactors, producing roughly the same amount of energy: 4.97% in Argentina, 3.55% in Mexico, and 3.17% in Brazil (see figure below).<sup>6</sup> Similarly, these countries are all involved in nuclear research. According to Irma Argüello, of the 250 research reactors operating in 56 countries in the world today, 19 are in 7 Latin American and Caribbean countries: 6 in Argentina, 4 in Brazil, 3 in Mexico, 2 in Chile, 2 in Peru, 1 in Colombia and 1 in Jamaica.<sup>7</sup> On the other hand, Chile has the ability to build fuel elements for research reactors, but not yet for nuclear power reactors. Still, the impressive growth of its economy and its heavy reliance on imported energy resources make it likely that Chile will eventually begin building commercial nuclear reactors. In spite of their economic and technological similarities, however, these states differ in terms of their nuclear energy policies and their willingness to cooperate with Washington. Consequently, there is extensive variation in the dependent variable across the case

studies, which leads to numerous observations over time, providing an ideal laboratory to explore the conditions for cooperation or defiance.

This report uses various sources of information, including primary and secondary resources, as well as interviews. A series of interviews were conducted in the summer of 2012 in Washington, D.C., and Vienna. The individuals interviewed included diplomats, staff members at the IAEA, scholars, and personnel working at non-governmental organizations dedicated to nonproliferation research and analysis.

**Figure 1: Country Profile Comparative Table**

	Argentina	Brazil	Chile	Mexico
Population (millions)	40	198	16.9	112.3
Area (1000 km <sup>2</sup> )	2791.8	8459.4	756.6	1964.4
GDP Average growth rate 2007-10 in constant 2000 US\$	5.2	4.1	4.2	3.69
Number of operational nuclear reactors	2, Embalse (1974) and Atucha I (1983)	2, Angra (1985)1 and Angra 2 (2000)	0, 2 nuclear research reactors	2, Laguna Verde 1 (1986) and 2 (1994)
% of electricity generated by nuclear facilities, 2011	4.97	3.17%	-	3.55
Total Net Output (MWe) produced by nuclear plants	935	1896	-	1308
Type of reactor/Technology	Natural uranium-PHWR-Siemens KWU	Low enriched uranium BWR-PWR-Siemens-KWU	-	Low enriched uranium-BWR General Electric

*Source:* Department of Nuclear Energy, Division of Nuclear Power, Nuclear Power Engineering Section, “Country Nuclear Power Profiles-2011 Edition,” IAEA, Vienna, Austria, 2011, available at: [http://www-pub.iaea.org/MTCD/Publications/PDF/CNPP2011\\_CD/pages/countryprofiles.htm](http://www-pub.iaea.org/MTCD/Publications/PDF/CNPP2011_CD/pages/countryprofiles.htm) (accessed 15 September 2012); Power Reactor Information System, “Country statistics,” IAEA, Vienna, Austria, 2011, available at: <http://www.iaea.org/PRIS/CountryStatistics/CountryStatisticsLandingPage.aspx> (accessed 15 September 2012); Irma Argüello, “La Energía Nuclear en América Latina: Entre el Desarrollo Económico y los Riesgos de Proliferación,” NPSGlobal, Fall 2010, available at: <http://npsglobal.org/esp/analisis/1101-energia-nuclear-america-latina-desarrollo-economico-riesgos-proliferacion-irma-arguello.html> (accessed 15 September 2012).

## LATIN AMERICA'S INTEREST IN NUCLEAR ENERGY

The nuclear energy programs in Latin America were originally conceived as a means of acquiring energy resources from the atom. Both Argentina and Brazil received their initial stimulation through the Atoms for Peace Program during the 1950s—a program conceived by the Eisenhower administration to assist Third World countries in developing their nuclear energy potential. At that time, both countries had ambitious economic programs focused on developing and boosting their indigenous industries. As a result, the governments of Latin America were increasingly pressured by multinational companies and local enterprises to supply enough energy resources to maintain a burgeoning industry. Cities like Buenos Aires, Rio de Janeiro, Sao Paulo, and Mexico City were heavily industrialized areas with increasing levels of energy consumption. The need to develop nuclear energy was then reinforced by the 1973 oil crisis. In the Brazilian case, this requirement was particularly acute. Here it became clear that the so-called “Brazilian miracle” of the 1960s and early 1970s relied on favorable external conditions and on cheap energy consumption.<sup>8</sup> It therefore appears that the original impetus behind Latin America’s energy nuclear programs was essentially economic.

Observation through Etel Solingen’s analytical lens suggests that Latin America’s energy nuclear projects were motivated by their inward-looking economic strategies, in the form of import-substitution industrialization.<sup>9</sup> One of the most important economic goals was the need and aspiration to modernize their respective countries by developing technology that would render them self-sufficient. As José Goldemberg argues, Argentina and Brazil were prompted to develop an indigenous technological capacity as a way of emulating the industrialized path of the most developed countries, particularly since “nuclear energy was presented as a *miraculous* source of energy in the United States, Britain, France and the Soviet Union.”<sup>10</sup>

Brazil saw the development of nuclear energy capabilities as key to overcoming the country’s underdevelopment. For example, in the Brazilian mindset, peaceful nuclear explosions were envisioned as a means to exploit the Amazon jungle. According to Brazilian diplomats in the 1970s, peaceful nuclear explosions provided “a solution to many of the serious problems which confront Latin American countries... such as the digging of canals, the connection of hydrographic basins, the recovery of oil fields, the release of natural gas, etc.”<sup>11</sup> This explains why both Brazil and Argentina were strong opponents of the nonproliferation regime. The Nonproliferation Treaty (NPT) text did not explicitly impose restrictions on the development of peaceful applications of nuclear explosions.<sup>12</sup> In practice, however, technical assistance and monetary aid for the development of peaceful nuclear explosive devices were considerably restricted by the nuclear-weapon states party to the Treaty. This was in direct response to India’s first nuclear detonation in May of 1974, which was described by the Indian government as a

peaceful nuclear explosion. Hence, Brazil and Argentina perceived the NPT as perverse, not because it left them unprotected from other nuclear powers that did not sign up, but because it represented an impediment to the development of an independent nuclear program aimed at transforming these countries into industrialized and modernized societies. Both states also disagreed with the discriminatory nature of the treaty because it created two types of legal obligations: one for nuclear weapon-states (who were not forced to immediately disarm) and another for non-nuclear countries (banned from pursuing nuclear weapons).<sup>13</sup>

Like Brazil in the 1930s and 1940s, postwar governments in Mexico embarked on import-substituting industrialization and considerable state involvement in the economy. In fact, it was the Mexican Revolution of 1910-1920 and its aftermath that created a political regime with a corporatist system and strong nationalist, developmentalist, and populist orientations. The regime was authoritarian in nature and based on a system of single-party rule, sustained by a coalition dominated by unions, peasants and national entrepreneurs. The regime survived through tariffs, quantitative restrictions to imports, and foreign direct investment, as well as nationalization of key sectors (including the oil and energy sector). This ushered in a period of stabilization and growth that lasted until the late 1970s, when the Mexican economy reached an impasse as a result of its macroeconomic policies.<sup>14</sup>

In spite of the limitations and goals of its economic strategy, Mexico was able to develop its own nuclear program, while fully joining the NPT regime and leading regional nonproliferation efforts. In fact, in 1968, Mexico was the first Latin American country to ever sign a full safeguards agreement with the IAEA; it was based on the Treaty of Tlatelolco, which predated the NPT. In due course, Mexico became the leading Latin American country in disarmament circles, often pushing for nuclear disarmament and nonproliferation measures in both regional and global forums. Although less advanced and perhaps less ambitious than Brazil's nuclear capability, the Laguna Verde nuclear plant began operations in 1986, after almost four decades of nuclear research. This was only a year after Brazil opened its first nuclear plant in 1985, known as Agra dos Reis I. While many Mexican nuclear scientists received training in the U.S., the IAEA provided the bulk of the technical and financial assistance to develop Mexico's nuclear capability. Surprisingly, Mexico did not develop any bilateral nuclear research agreements with the U.S. or any other country during the initial stage of the construction of Laguna Verde. As John R. Redick discovered in a pioneer study of Latin America's nuclear programs, "A desire to be independent with respect to its own power supply is also noted by Mexican officials themselves as an important rational for opting for nuclear power."<sup>15</sup>

To some extent, the aspiration to become energy independent and autonomous continues to drive Latin America's interest in nuclear energy today. The region is certainly rich in natural resources and commodities, including oil and gas. Yet, most of these resources involve fossil fuels and hydroelectric power. This has made Latin America overwhelmingly dependent on oil, gas, and dams. Similar to the events of the 1950s and 1960s, the economic boom in the region has generated increased electricity demand, which cannot be sufficiently satisfied with current energy resources. Even energy-rich countries such as Venezuela, Mexico, Brazil, and Argentina face serious power challenges. Mexico, for example, is one of the few Latin American countries that have already achieved energy independence (it does not need to import energy resources from abroad, although it does import gasoline from the U.S., since it cannot fully refine its own oil). However, its energy consumption is overwhelmingly dependent on oil and gas (86%). According to Sharon Squassoni, electricity demand in Mexico is projected to grow 6% annually, far above the 2.6% global average and roughly the same as India and China.<sup>16</sup> Moreover, this is happening when oil production in both Mexico and Venezuela—the largest oil producing countries in Latin America—has been steadily declining. Additional nuclear reactors seem unlikely in Mexico for the time being. As Squassoni argues, “Even if Mexico builds eight new reactors, nuclear power will only account for 12 percent of electricity generation and do little to relieve the country's overwhelming dependence on oil and natural gas.”<sup>17</sup> Luckily for Mexico, it has the fourth largest potential reserves of natural gas in the world, after China, the U.S., and Argentina. Natural gas prices have spiked in the past years, however, making this resource expensive to extract and supply. Mexico is thus being forced to reconsider its nuclear ambitions. According to Michael S. Lerner, the national energy strategy of Mexico advocates for a significant role for nuclear energy in the medium and long-term future. For Jordy Herrera, President Calderon's Energy Minister, “It is time to put nuclear power on the table.”<sup>18</sup>

Other Latin American countries face similar challenges. Brazil, another energy-independent country, is expected to become a significant global oil producer in the next decade. Still, electricity output in 2005 was significantly dependent on hydroelectric sources (92.5%). In 2000 and 2001, low rainfall and droughts caused blackouts throughout the country. In 2009, a hydroelectric power failure left Sao Paulo, Rio de Janeiro, substantial parts of the industrial south, and even neighboring Paraguay without electricity for over two hours.<sup>19</sup> Brazil is often confronted between two challenges: depend on hydroelectric energy, with its increasing risk for power failure, or become dependent on fossil fuels and ethanol (the commodity curse). Energy imperatives thus motivated Brazil to expand its nuclear energy capacity and begin the construction of a third nuclear station (Angra 3) in 2010; after multiple delays, it is expected to be in full operation by 2016. The current government has repeatedly argued that it needs to expand its nuclear program by between four and eight new reactors by 2030. According to Marcos C. de Azambujá, Brazil already has the sixth largest uranium reserves in the world, and a

substantial part of its territory remain prospected; these resources provide substantial incentives for nuclear energy expansion.<sup>20</sup> Yet, the Ministry of Energy and Mines has recently announced that once Agra 3 is finished, it will not build more nuclear plants until 2020.<sup>21</sup>

Argentina also faces an energy bottleneck. According to Stephanie Hanson, from the Council on Foreign Relations, since the financial crisis of 2001, Argentina has substantially subsidized domestic energy prices. “As a result, foreign investment in the oil and gas industry has dwindled at the same time that domestic demand has skyrocketed. Once seen as a viable exporter, Argentina is now dependent on gas imports from Bolivia.”<sup>22</sup> Indeed, since 2001, all sources of energy resources have suffered some severe changes, including nuclear energy. During the 19780s and 1980s, Argentina was by far the leading Latin American country in nuclear energy research, development, and production (far more developed and advanced than Brazil or Mexico). It was Latin America’s pioneering country in nuclear energy as it was the first one in the region to open a nuclear plant in 1974. In the 1980s, close to 10% of its energy production came from nuclear energy. To date less than 5% is produced by its two nuclear reactors. The government of President Cristina Hernández de Kirtchner has been trying, unsuccessfully, to catch up with the insatiable demand for energy that the economic recovery has generated. In 2006, it invested close to \$3.5 billion USD to open a third nuclear plant (Atucha 3) and extended the life of its second nuclear reactor (Embalse) by 25 years. It also announced plans to open a fourth nuclear plant (CAREM for *Central Argentina de Elementos Modulares* or Argentine Central for Modular Elements) that, if constructed, will use mostly local resources from the National Atomic Energy Commission. The current government is analyzing the construction of a fifth nuclear plant.<sup>23</sup>

Chile is in a different situation altogether. Economically speaking, this is Latin America’s most successful country. According to *The Economist*, its income per capita has tripled since it returned to democracy in 1990, to around \$16,000 USD/capita. Chile is thus on the verge of becoming Latin America’s first developed country. Its success is based on a simple formula: free trade and low public spending.<sup>24</sup> But Chile’s success story faces greater strains and hurdles because it needs to import almost all its energy resources (more than 70%).<sup>25</sup> Chile experienced increased and sustainable economic growth for more than two decades, with an equally insatiable demand for power. Although Chile has natural gas reserves and is the world’s largest copper producer, its gas consumption has increased by an average of 21.7% annually. Constant droughts (Chile has the world’s driest desert, Atacama) impede the development of hydroelectric power. Neighboring Argentina and Bolivia could provide most-needed energy resources through their vast natural gas reserves, but these South American states have become increasingly unreliable. Political instability in Bolivia and energy rationalization policies in Argentina have halted gas

exports to Chile. Hence, the Chilean economy is extremely vulnerable to external shocks in the gas and oil markets, with limited gas supply and high petroleum prices.<sup>26</sup>

With electricity consumption increasing faster than all forms of energy consumption and faster than growth in the economy, Chile is rapidly running out of options. Nuclear energy has thus been suggested as an alternative resource to fuel demand and growth. This South American economic power already has two research reactors managed by the Chilean Nuclear Energy Commission. Therefore, it has the economic resources and the “know-how” to take the next step: develop a nuclear energy plant. In 2007, then-President Michel Bachelet set up a working group—the Zanelli Commission—to advise the government on the opportunities and challenges involved in the use of nuclear energy. The Commission’s report determined that Chile was “not ready to embrace the nuclear option just yet—institutionally or legally. The country does not, for example, have people sufficiently trained in nuclear technology, and private investment alone would probably not be enough to pay for potential nuclear plants.”<sup>27</sup> In view of the Commission’s report (which some say was influenced by environmental groups), President Bachelet delayed the decision to build a nuclear power until 2010, when Sebastian Piñera took office.<sup>28</sup> In the midst of this decision, the 2011 earthquake and tsunami took place in Japan, originating the nuclear disaster in the Fukushima Daichi plant. The Japanese tidal wave was felt in Chile, but with political ramifications, as fears of natural disasters have continued to delay decisions about its nuclear future. After all, Chile is also vulnerable to earthquakes and tsunamis, and could face similar challenges to those encountered by Japan. An 8.8 magnitude earthquake struck Chile in 2010, triggering a tsunami that affected the central coast. The Chilean government is consequently being extremely cautious with its plans to build a nuclear energy plant.

In sum, energy imperatives drive Latin America’s increased interest in nuclear power, but do these nuclear ambitions pose serious challenges to U.S. and global nonproliferation efforts? This matter is discussed in the following sections.

## **BACKGROUND HISTORY: THE REVERSAL OF A NUCLEAR ARMS RACE IN SOUTH AMERICA**

While all Latin American states share similar energy needs, their nuclear policies have varied substantially throughout time. There is considerable variance in the motivations, directions, and pace governing nuclear policies. Historically, Argentina, Brazil, Chile, and Mexico have complied differently with global and regional nonproliferation norms. With the exception of Mexico, the founding father of the nuclear-weapon free zone in Latin America, all

other South American nuclear powers are latecomers to the nonproliferation regime. Argentina, Brazil, and Chile remained adamantly opposed to the NPT during the dictatorial era, and did not ratify the treaty until their recent democratization in the mid-1990s. The two most advanced nuclear powers in the Southern Cone of South America—Argentina and Brazil—developed their respective nuclear plants under military tutelage, with little civilian intervention, and in the midst of a bilateral, military rivalry. Argentina’s military junta (1976-1982) developed a secretive ballistic missile project with Egypt and Iraq, which could have transported nuclear bombs.<sup>29</sup> In Brazil, the military (1964-1985) envisioned a parallel and secret project, which involved the building of centrifuges to enrich uranium in an experimental center near Sao Paulo.<sup>30</sup> A report by the National Congress of Brazil, made public a few weeks after President Collor de Mello took office in December of 1990, revealed that the nation’s former military rulers intended to build an atomic bomb. The Congressional committee inquiry revealed: “At a historic moment there was a decision, taken within the Planalto Palace—the seat of government—to build a nuclear weapon.”<sup>31</sup>

Interestingly enough, U.S. pressures and direct sanctions to halt Argentina and Brazil from becoming military nuclear powers backfired. In 1979, both military juntas closed ranks in the face of shared pressures from the Carter administration, leading to the Argentine-Brazilian nuclear rapprochement, which facilitated nuclear cooperation among former military rivals.<sup>32</sup> Brazil went further by canceling its mutual defense treaty with Washington, and rejected an offer of more than \$50 million USD in military sale credits in exchange for nuclear security guarantees.<sup>33</sup>

A series of domestic changes (not U.S. bilateral pressures or sanctions), involving mostly transitions to democracy, finally brought these South American states into the NPT and Tlatelolco treaties. In the case of Argentina and Brazil, this took place slowly and progressively through a series of bilateral agreements and confidence-building measures. In 1990, the democratically-elected Presidents Carlos Saúl Menem of Argentina and Fernando Collor de Mello of Brazil met at the Iguacu Falls, which forms a common border between the two countries. There they signed an international agreement, whereby they renounced the development of nuclear weapons, and set forth a number of institutional mechanisms to assure one another that their nuclear establishments would live up to their international commitment. A safeguard agreement was negotiated under the auspices of the IAEA. In 1991, the two presidents met again in Mexico, where they signed the Guadalajara Accord for the Use of Nuclear Energy for Peaceful Purposes. This laid the basis for the creation of the first bilateral institution—namely, the Argentine-Brazilian Agency for Accounting and Control of Nuclear Materials (ABACC). Under ABACC, Argentina and Brazil are supposed to report a complete inventory of their nuclear materials to the bilateral agency, as well as thorough description of their nuclear



facilities. ABACC's main task is to verify, via *in situ* inspections, that the information provided by both governments is accurate. This bilateral process eventually led Argentina and Brazil to ratify the Tlatelolco Treaty in 1994, and the NPT in 1994 and 1998 respectively.<sup>34</sup> Chile followed suit, ratifying both treaties in 1994 and 1995, after its full return to democracy in 1990. Therefore, the nuclear reversal process in South America was a notable achievement of the 1990s, and has been widely acknowledged as a successful diplomatic story of regional denuclearization.

## **U.S. LOOMING CONCERNS ABOUT LATIN AMERICA'S NUCLEAR AMBITIONS AND THE SOURCES OF TENSION**

In spite of the region's profound changes in nuclear policy, Latin America's recent interest in nuclear power poses challenges for U.S. and global nonproliferation efforts. Fears of so-called horizontal proliferation—acquisition of nuclear weapons by countries that do not have them yet—have abated for now, but challenges persist. As Rodrigo V. Álvarez argues, “being non-nuclear does not mean Latin America is not problematic.”<sup>35</sup> In fact, there are three outstanding issues of concern for U.S.-Latin American nuclear relations.

First, as a result of 9/11, Washington is concerned about the possibility that terrorists might acquire nuclear weapons or use radiological dispersal devices (RDDs) to challenge global security. The IAEA conducted an exhaustive report in 2003, indicating that more than 100 countries, including Mexico, Argentina, Brazil, and Chile, had inadequate controls to prevent or detect the theft of radioactive materials intended for RDDs.<sup>36</sup> Some of these concerns have proven to be legitimate, as both Argentina and Mexico have experienced recent incidents related to nuclear security.<sup>37</sup> For example, in February of 2009, two men broke into an underground bunker of Baker Atlas, a company that houses drilling equipment and cesium-137 in the Patagonian city of Neuquén. A security camera showed that burglars tried to steal a heist of cesium in what was the first theft of radioactive material in Argentina. Although the individuals were caught before they could perpetrate the theft, the incident put to the test a new emergency-response process that Argentina's Nuclear Regulatory Authority had recently launched as part of a U.S. global nuclear security program.<sup>38</sup>

Similarly, in April 2012, an orphan cobalt-60 radioactive source inside a Picker 3000 radiography camera was found in Ciudad Juárez, Mexico. According to the Nuclear Threat Initiative, an NGO based in Washington D.C., Mexican authorities cannot control all radioactive sources located in the country because many of them enter illegally. During the past decade, four low-activity radioactive sources disappeared in Mexico. Few have been recovered, and many often ended up in junkyards and scrap metal processing facilities.<sup>39</sup>

In Brazil as well, authorities tracked down and seized nearly 1,000 pints of uranium-rich ore in January 2010, in the northern state of Amapa, an isolated rain forest region, following a four-month probe.<sup>40</sup> All these reported incidents have raised concerns about nuclear security in the region. The question looming in the horizon is whether these Latin American states can properly secure their nuclear plants and radioactive material against diversion or theft.

Recently, the Nuclear Threat Initiative and *The Economist* surveyed the precautions that more than 144 countries have in place to ensure nuclear security, and ranked the nations from best to worst. The survey, also known as the nuclear materials security index, measured 18 variables, including political stability, security and control measures, and whether or not the country is home to groups interested in illicitly acquiring nuclear weapons. The ratings for Latin America were somewhat surprising. The countries with the most developed nuclear energy programs were not necessarily the best ranked. Argentina and Mexico were the only Latin American states that appeared among 32 countries with weapons-usable nuclear material, which already suggests a higher level of threat. Both countries scored similarly in the overall ranking: 16 and 19 respectively. They were far from the highest-ranking states (Australia, Hungary, Czech Republic, Switzerland, Austria, Netherlands, Sweden, and Norway), but appeared closer to the U.S. (13), which has a sprawling nuclear complex that dates from the earliest days of the atomic era. Among 144 countries without nuclear materials, Chile, Peru, and Cuba were ranked very highly (25, 28, and 36 respectively); Brazil appeared as a middle-ranked state (46), while Haiti, Venezuela, Belize, and Bolivia were low rated and marked as “warning” for failed statehood. When all 18 variables are combined among all states, Argentina, Mexico, and Chile received almost identical scores (73-74 out of 100). Surprisingly, Brazil—the so-called emerging power in South America—had the lowest nuclear security index (65) among the four cases analyzed in this report.

**Figure 2: Nuclear Threat Initiative Security Index and Ranking**

<b>Score/country</b>	<b>Argentina</b>	<b>Brazil</b>	<b>Chile</b>	<b>Mexico</b>
<b>Quantities and sites</b>	96	-	-	85
<b>Security and control measures</b>	69	-	-	68
<b>Global norms</b>	71	60	87	71
<b>Domestic commitments and capacity</b>	93	70	57	96
<b>Societal factors</b>	55	64	82	56
<b>Overall score</b>	74, 16	65, 41	74, 25	73, 19

<b>and ranking</b>				
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*Source:* Nuclear Materials Security Index: Results, The Nuclear Threat Initiative, Washington, D.C., January 2012, available at: <http://www.ntiindex.org/results/#1-0> (accessed 17 September 2012).

In April 2010, President Obama hosted the Nuclear Security Summit in Washington D.C., to discuss collective steps to secure vulnerable nuclear materials and prevent acts of nuclear terrorism. In total, 47 nations attended the summit, including four Latin American states: Argentina, Brazil, Chile, and Mexico. President Obama requested that countries voluntarily commit to undertake measures for nuclear arms control. Argentina and the U.S. signed a Megaports Agreement that will help prevent the smuggling of nuclear materials at the Port of Buenos Aires. Chile and Mexico committed to convert their nuclear fuel from highly enriched uranium (HEU) to low-enriched uranium (LEU) (more on this in the next section). However, Brazil did not make any explicit commitments and then voted against a U.S.-sponsored United Nations (UN) Security Council resolution that imposed sanctions on Iran.

Concerns about nuclear security in Latin America are not exclusively limited to the ability of states to safeguard their own nuclear plants, but also include whether these countries house criminal organizations interested in nuclear trafficking. While Latin America is not confronted by religious and ideological extremism, South America certainly faces security challenges. U.S. officials have long suspected that the common border where Argentina, Brazil, and Paraguay meet, known as the Triple Frontier (not too far away from where the ABACC signature took place), harbors jihadists ( Hamas and Hezbollah). A recent article by Christine Folch, which appeared in *Foreign Affairs*, argued that U.S. programs to combat criminal activity and improve intelligence failed to apprehend any terrorists. “In fact, their interventions did little to curtail the broader lawlessness that plagues the region.”<sup>41</sup> Terrorist attacks have taken place in the Southern Cone of South America. Two separate bombings took place in Buenos Aires in 1992 and 1994, targeting the Israeli Embassy and the Argentine Jewish Mutual Aid Association, in which more than 90 people died and 435 were injured. Although no one was ever convicted, and Iran was accused of both terrorist incidents, U.S. officials have long suspected that Hezbollah was involved.<sup>42</sup> Consequently, there is a genuine concern that more nuclear plants in the region could possibly attract the attention of even more terrorist networks interested in developing the so-called “dirty bomb” with RDDs.

Latin American states also face homegrown security challenges of their own, ranging from drug trafficking to insurgency. While there is little evidence suggesting that these criminal organizations are currently engaged in nuclear trafficking, the risk is there. According to Alex Sánchez, in 2008, Colombian security forces discovered that the Revolutionary Armed Forces of

Colombia (FARC), a revolutionary guerrilla organization that has waged war against the military since 1964, managed to obtain 9 kilograms of depleted uranium. Officials never fully clarified where the FARC might have obtained those materials.<sup>43</sup> But these and the other incidents reported in Mexico—involving illegal trafficking of radioactive material—suggests that a “nuclear Latin America” could jeopardize efforts to prevent nuclear terrorism in the Western Hemisphere.

The second area of concern for the U.S. government involves compliance with international nuclear safeguards. The IAEA has been the main international body in charge of carrying inspections in nuclear plants and ensuring that nuclear materials are being used for civilian and peaceful purposes. To date, Argentina, Brazil, Chile, and Mexico are members of the IAEA and its Board of Governors, which dictates the agency’s policies. In fact, Argentina and Brazil are permanent members of the Board for the Latin American region, while the others have been designated for one-year terms (this state of affairs has been historically disputed by Mexico, which claims to produce as much nuclear energy as Brazil and Argentina). As a result, all Latin American states have made safeguards arrangements with the IEAE, but the level of commitment varies substantially from case to case, leading to increased suspicion.

In 2004, for example, Brasilia denied the IAEA permission to carry out inspections in its uranium enrichment plant in Resende, near Rio de Janeiro. According to Etel Solingen, a confidential agreement allegedly increased IAEA access to the nuclear plant, but was short of unrestricted inspections. Brazil then temporary suspended Resende’s official start date in 2006, in an effort to avoid comparisons with Iran, which had also restricted inspections to its nuclear facilities.<sup>44</sup> U.S. reaction to Brazil’s nuclear policy was initially supportive. Colin Powell, then-Secretary of State, visited Brasilia in 2004, precisely when negotiations with the IAEA and Brazil were at an impasse. During a press conference, Powell denied any similarities between Brazil and Iran or North Korea. “I don’t believe whatever arrangement Brazil and the IAEA come to would in any way give either North Korea or Iran any additional bargaining power with the IAEA,”<sup>45</sup> Powell said.

However, U.S.-Brazilian nuclear relations deteriorated when Brazil continued to resist efforts to increase the IAEA’s inspections mandate. Indeed, in recent years, the international community recognized the need to strengthen and increase the effectiveness of the safeguards system, which had been deceived by Iraq’s secret nuclear program in the 1990s. In response to Iraq’s deception, the IAEA encouraged its members to voluntarily sign the Additional Protocol, which allows the agency to have more access to inspections and information regarding nuclear activities.<sup>46</sup> As James Doyle describes, “the goal of comprehensive international safeguards agreements is to detect the diversion of significant quantities of nuclear material from peaceful

purposes within certain time periods... the overall objective is to provide credible assurance of both the non-diversion of nuclear material from declared activities and of the absence of undeclared nuclear material and activities in the state as a whole.”<sup>47</sup> Ironically, Argentina and Brazil denounced the Additional Protocol, failed to sign it, and then requested an exception.

Various Latin American countries objected to the Additional Protocol, including most notably Cuba and Venezuela. Together, they led a group of nations within the Non-Alignment Movement (NAM) to make conditional their adherence to the Additional Protocol. Both countries argued that unless there was nuclear disarmament by nuclear weapon states and transfer of peaceful nuclear technology to the Third World, there would be no commitment for more safeguards.<sup>48</sup> This very same position was advocated by Brazil during the 2010 NPT Review Conference, even though it was not a member of the NAM. But the Brazilian government raised additional objections. It argued that the system was intrusive and jeopardizing its ability to develop an independent and indigenous centrifuge technology.<sup>49</sup> Samuel Pinheiro Gimaraes, the Minister of Strategic Affairs, then denounced the Additional Protocol for allowing nuclear weapon states to have free access to the most sensitive nuclear technologies of developing states. Luis Pinguelli Rosa, head of Eletrobras, the national electric company, declared that “there are no conceptual secrets... But there are advanced technological solutions, such as equipment, setup and materials, that Brazil has the right to guard.”<sup>50</sup> In so doing, Brazil distanced itself from the NAM’s position and expressed reservations that were more consistent with the policies advocated by proliferators with highly advanced nuclear technologies, such as India, Pakistan, and Israel. According to Brazil, the protocol’s guidelines on nuclear technology could promote industrial espionage. Furthermore, from Brazil’s perspective, ABACC already provided the safeguards negotiated under the Additional Protocol.<sup>51</sup>

According to Mark Hibbs, confidentially, Argentine diplomats were puzzled by Brasilia’s rejection to the Additional Protocol, since ABACC did not include a provision for short-notice inspections. In their view, the Additional Protocol would have provided increased assurances and transparency about South America’s nuclear programs. But the Argentine government had a sudden change of mind and, by 2010, supported Brazil’s posture. Argentina concluded that an Additional Protocol, without Brazil taking that step in tandem, was impractical.<sup>52</sup> As a result, Argentina and Brazil became the only two members of the exclusive Nuclear Suppliers Group (NSG) that refused to sign the Additional Protocol. The NSG is an international body that gathers the countries that can export and transfer nuclear materials, including the U.S. and the other four recognized nuclear weapon states (UK, France, Russia, and China). Amidst increased pressures from the NSG and in order to prevent their policies from being ostracized in the nuclear regime, Argentina and Brazil closed ranks again and requested a joint exception. They argued that ABACC exempted them from making additional arrangements with the IAEA. For

Buenos Aires and Brasilia, ABACC had already reached an agreement with the IAEA in 1997, giving inspectors access to any part of the country, and ensuring the absence of non-declared nuclear materials and activities.<sup>53</sup> To the surprise of many—including South Africa, which had originally supported Argentina and Brazil—the NSG conceded and the IAEA accepted an exceptional clause that applied only to the ABAAC members.<sup>54</sup>

Critics of the Argentine-Brazilian exception, such as Hibbs, correctly point out that the ABACC and the Additional Protocol are intended to build confidence that nuclear activities are peaceful, but they are not the same. As Hibbs argues, “The former is a legal document setting forth inspection rights and the latter is an institution. The Additional Protocol provides the IAEA specific rights to access a wealth of information that is outside the purview of standard NPT safeguards agreements, especially concerning undeclared activities. The agreement between the IAEA and ABACC, on the other hand, is similar to standard NPT safeguards agreements and does not give the IAEA rights specified by the Additional Protocol.”<sup>55</sup> Furthermore, the ABACC cannot move unless the governments of Argentina and Brazil, which effectively control it, move forward; so it has less political independence to autonomously assess information provided by the governments themselves. The exception clause given to Argentina and Brazil also raises the possibility that other countries with access to sensitive nuclear material will request exceptional treatment, thus undermining the multilateral nonproliferation regime. Ironically, the ABACC concession created a similar condition to the one that Brazil had criticized for decades before joining the NPT, namely, a regime based on discrimination and exceptions with two different types of legal obligations, one for ABACC-members and another for non-ABACC states.

Why has Brazil been so fervently opposed to the IAEA inspection mechanisms and the Additional Protocol? Foreign policy imperatives, economic interests, bureaucratic and military politics appear to have a role in the overall direction of Brazil’s nuclear motivations.

First, one line of thinking considers that Brazil’s nuclear policy in multilateral fora, such as the IAEA, is influenced by its ambitious foreign policy agenda. As Diego Santos Vieira de Jesus reminds us, Brazil is using nuclear policy to promote its new role as an “emerging power” by developing close relations with other southern and nuclear partners, including India and China. Like India, Brazil effectively relies on its multilateral policy to show off its diplomatic muscle (or soft power) and influence the decision-making process.<sup>56</sup> During President Luiz Inácio Lula da Silva’s administration, for example, Brazilian diplomats and politicians alike engaged in an international public relations campaign that would grant Brazil a much-desired permanent seat in the UN Security Council.<sup>57</sup> In this context, Brazil might be using its nuclear policy as a bargaining chip to achieve its diplomatic goals. This is a lesson that Brazilians might have learned from its southern partner, India, which recently received an endorsement from

Washington for its bid for a permanent seat on the UN Security Council in exchange for a nuclear agreement. In particular, a 2008 nuclear deal with India now allows the U.S. to sell nuclear fuel, technology, and reactors to Delhi for peaceful energy, despite the fact that it tested nuclear bombs in 1974 and 1998, and never signed the NPT.<sup>58</sup> Brazil feels that it is equally entitled to international status and recognition and should thus be treated like India.

Nevertheless, Brazil's ambitious foreign policy has generated controversy and created tension with Washington. In 2010, Brazilian and Turkish government officials brokered a tentative compromise with Iran in the international standoff over its nuclear program, a development that could have undermined the international sanctions imposed on Iranians under the UN and IAEA umbrellas.<sup>59</sup> The U.S. and other states, including Israel and the European Union, received this move with skepticism. The agreement raised serious concerns about Brazil's foreign policy motivations and aspirations, especially for a country that attempts to serve as a bridge and neutral mediator in regions like the Middle East. During an executive visit of President Dilma Rousseff of Brazil to Washington in April of 2012, she and her counterpart, President Obama, emphasized the positive aspects of the bilateral relationship, although the sharing of classified military and defense information remained notoriously low.<sup>60</sup> Moreover, no breakthroughs were revealed regarding Brazil's foreign policy in Iran. President Rousseff has rowed back from the Iran-Brazil friendship, but this reinforced the U.S. government impression that the South American country is unpredictable and perhaps naïve.<sup>61</sup>

As *The New York Times* reported, "qualms persist in Brasilia about intervening in the Middle East conflicts,"<sup>62</sup> and the U.S. is certainly not ready to give Brazil the same nuclear treatment it has offered to India, nor its support for a UN Security seat. In fact, in 2010-11, Brazil served as a non-permanent member at the UN Security Council. During this period, Brazil abstained from supporting a resolution that provided the legal basis for military intervention in Libya. When the Syrian political crisis erupted and Assad's regime was put under UN scrutiny, the so-called BRISA countries (Brazil, India, and South Africa) sent diplomatic envoys to Damascus. This move infuriated U.S. diplomats. Ambassador Susan Rice, the U.S. Permanent Representative to the UN, expressed her discontent with BRISA by declaring: "It's been a very interesting opportunity to see how they respond to the issues of the day, how they relate to us and others, how they do or don't act consistent with their own democratic institutions and stated values... Let me just say, we've learned a lot and, frankly, not all of it encouraging."<sup>63</sup>

A second line of thinking argues that Brazil's resistance to the Additional Protocol and its ambivalent policy towards IAEA inspectors is influenced by economic policies. In particular Etel Solingen maintains that South American states—such as Argentina, Brazil, and Venezuela—are once again embracing inward-looking economic strategies that propelled the first wave of

nuclearization in the 1960s and 1970s. Leaders in Brazil and Argentina are increasingly implementing nationalist and populist policies that tend to be less reliant on international markets and technology. In this regional environment, inward-looking countries are less inclined to cooperate with international organizations. As Solingen argues, “Luis Inácio da Silva (Lula), who campaigned as a Worker’s Party critic of both the global economy and the NPT, remained closer to the military’s nationalist themes than his Argentine counterparts, reflected in support for nuclear energy and space programs, and demands for permanent UN Security Council status.”<sup>64</sup>

Indeed, the efforts to increase nuclear energy output in Argentina and Brazil have been led essentially by state and public interests, with no role for private or foreign investors. Both countries intend to open new nuclear reactors without international assistance, relying mostly on indigenous and public resources. So there is substantial evidence that parts of Latin America are returning to autarky and import-substitution strategies. Even with inward-looking strategies, however, countries vary substantially in their international commitments and compliance.

Comparatively speaking, the Argentine economy is less open to foreigners than Brazil’s. Argentina has not yet settled its foreign debt with international creditors, from the 2001 financial crisis, and has only limited access to foreign capital. But even with these economic limitations, Buenos Aires is still more willing to cooperate with IAEA authorities than Brasilia. In 2010, the government of President Cristina Fernández de Kirchner announced that it would re-open a gaseous diffusion atomic facility that was shuttered in 1996; it relies on enrichment capabilities that could produce atomic reactor fuel as well as nuclear weapon material.<sup>65</sup> However, unlike Brazil, the Pilcaniyeu Technology Complex, located in the Rio Negro province of Argentina, is currently under IAEA safeguards and national authorities have not restricted access to international inspectors.<sup>66</sup>

Brazil certainly has economic and industrial interests at stake, which might explain its reservations towards increased nuclear safeguards. Brasilia is seeking to protect commercial secrets and fears the inspections regime. The problem is not the IAEA inspectors themselves—who, for the most part, are nuclear physicists with a good record for keeping secrets—but what they might discover. In fact, there is strong suspicion that the technology used to build the nuclear plant in Resende (Agra 3) was based on the design by the European enrichment consortium (UNRECO). As Maria Rost Rublee argues, “If this were the case, it would undermine Brazil’s claim to indigenous development of the centrifuges, as well as raise questions about how the design was acquired.”<sup>67</sup> In other words, the information required under the Additional Protocol would force Brazil to reveal whether it has infringed international copyrights and patents in nuclear technology. Moreover, according to Hibbs, Brazil would be



obliged to render additional information about its nuclear parallel project and “disclose to the IAEA any high-level radioactive waste inventories, which would testify to historical production of undeclared nuclear material processing in the country.”<sup>68</sup> Some policy experts in Brazil believe that this is exactly what the country needs to do. As Oliver Stuenkel argued recently, “Brazil’s next president should instead take a clear stand in support of nuclear transparency by reopening all of Brazil’s nuclear facilities to the IAEA. Only that will put an end to the uncertainty that is undermining Brazil’s credibility and its ability to realize its foreign policy objectives—including obtaining a permanent seat on the UN Security Council.”<sup>69</sup>

A third school of thought puts emphasis on Brazil’s domestic politics, especially its bureaucratic governmental complex, which is inherently heterogeneous and fragmented. Defense, technology, and foreign policies are often implemented by different bureaucratic organizations that rarely, if ever, interact with each other, unless the president is involved. Within Brazil, there is an explicit division of labor between generals, bureaucrats, and ambassadors. As Marcos C. de Azambujá argues, “Today, three separate ministries have jurisdiction over the Brazilian nuclear program: the Ministry of Science and Technology; the Ministry of Mines and Energy, which oversees the National Commission for Nuclear Energy and INB; and the Ministry of the Environment, with the Brazilian Institute of Environment and Renewable Natural Resources as its executive agency. Nuclear policies, in their broadest scope, fall under the supervision of the president’s office, and the Ministry of External Relations has an influential role on issues with international implications.”<sup>70</sup>

This division of labor means that there are deep policy divisions as well. In the area of nuclear policy, specifically, there is still a controversial divide between those who advocate for the “bomb” and those who favor unconditional international cooperation with the nonproliferation regime. The Brazilian Constitution and the international obligations within the NPT legally forbid Brazil from acquiring a nuclear weapon, although these legal obligations have not silenced those who believe the country should develop a nuclear device.

During the 1990s, the Collor de Melo administration used international institutions, such as ABACC and the NPT, to manage the military. Establishing a bilateral institution under the IAEA umbrella created expectations that nuclear policy would be open to international examination, as a means of achieving civilian control over nuclear policy, which in turn would broaden the participation of other decision makers outside the military establishment. Such a policy could not have been implemented unilaterally, which is why Brazilian civilian leaders sought international participation in the nonproliferation regime, deliberately to gain leverage over the militaries that they sorely distrust. Through this diplomatic maneuvering, nuclear policy was de facto transferred to the diplomatic establishment, led by the Ministry of Foreign Affairs,

known as Itamaraty.<sup>71</sup> In the Brazilian case, Itamaraty's main role "was to soften the nationalistic stances defended by the Brazilian military."<sup>72</sup>

However, not everyone was satisfied with the transfer of power and authority to the diplomats, who are mostly supportive of the nonproliferation regime. The military, defense and even scientific communities remained skeptical. Ironically, many of these voices came back to power when President Lula assumed office in 2002. For example, in 2009, Vice President Jose Alencar publically declared that nuclear weapons would be a boon to the security of Brazil. Alencar, who was a former minister of defense, declared: "The nuclear weapon, used as an instrument of deterrence, is of great importance for a country that has 15,000 kilometers of border to the west and a territorial sea that contains oil reserves."<sup>73</sup> This was a shocking declaration coming from one of Brazil's highest public authorities. The presidential spokesman quickly dismissed Alencar's comments, which he argued "did not reflect the position of the government."<sup>74</sup> Still, the Vice President's statements raised questions about why a peaceful country, surrounded by mostly friendly countries, would require a nuclear bomb for deterrence.

Furthermore, in 2007, President Lula created a new executive office to address Brazil's long-term economic, social, and international goals, known as the Ministry of Strategy and Long-term Planning. To chair this new office, he appointed Roberto Mangabeira Unger, a philosopher and Harvard law professor. Mr. Unger, who had once taught President Barack Obama at Harvard, was appropriately nicknamed the "minister of ideas," because of his assignment to "think" about Brazil's future. As the so-called "minister of ideas," Mr. Unger was in charge of planning Lula's National Defense Strategy. He proposed to extend conscription and suggested the use of the military to accomplish technological innovation, including the mastery of nuclear energy with nuclear powered submarines and the creation of a domestic arms industry. He was also credited with forcing the Lula administration to think about the role of the Army in a post-democratic era in which projecting military power abroad would indeed be necessary to accomplish full power status.<sup>75</sup> Certainly, none of these ideas were innovative at all; the military had long envisioned this long-term view for Brazil during the dictatorship. Just as Itamaraty's diplomatic *raison d'être* in the UN focused on gaining a permanent seat for Brazil in the Security Council, the dominant and perennial feature of the Brazilian military thinking has been on developing power projection abroad to become a major military power. What was surprising, however, was that most of these ideas were being resuscitated under a civilian and democratic leadership.

The predominant view among some strategists is that Brazil conceded too much when it resigned itself to not develop nuclear weapons and joined the NPT. Reversing the decision to become nuclear is thus suggested as a means of recovering bargaining leverage and power status.

On the other hand, environmental groups, scholars, diplomats, and some scientists (not military scientists) consider that such a move is fundamentally flawed because it could destabilize the region and harm Brazil's national interests. As Oliver Stuenkel argues, "Brazil could conceivably use its status as the only BRIC member without nuclear weapons to play a leading role in the quest for global disarmament."<sup>76</sup>

Therefore, the issue of whether Brazil should remain as a non-nuclear-weapon power is still not completely resolved among national elites, even as the country is legally tied to international agreements. The bureaucratic divide between hawks and doves may explain why Brazil has been so ambivalent in its nuclear policy and so hesitant to accept the IAEA Additional Protocol. Brazil is unlikely to adhere to additional nuclear safeguards until it fully settles the bureaucratic divide within its own government. In the meantime, nuclear experts increasingly perceive Brazil as wanting to re-evaluate its commitment to nonproliferation, and this could be problematic for Washington.<sup>77</sup>

This brings us to the third and final issue of concern for the U.S.: the militarization of nuclear policies in Latin America. There are growing concerns in Washington about military assistance and sales in Latin America from Brazil, Iran, Russia, and France. In testimony before the Senate Armed Services Committee, General Douglas Fraser, the head of the U.S. Southern Command, declared that "Iran continues expanding regional ties [throughout Latin America] to support its own diplomatic goal of reducing the impact of international sanctions connected with its nuclear program."<sup>78</sup> Although it is difficult to determine the extent to which Iran has expanded its military influence in the region, Washington is assessing whether the government of President Hugo Chávez violated UN sanctions by collaborating with Iran on energy and power initiatives.

Likewise, Argentina has recently established nuclear ties with Russia and signed 14 bilateral agreements in 2010, including one on nuclear energy cooperation with Rosatom, which is providing an assessment of potential locations for nuclear fuel cycle facilities and related infrastructure.<sup>79</sup> Nevertheless, there is no concrete evidence that the Argentine nuclear project has military components. Quite the opposite, it has fully civilianized its nuclear program, and civilian control over the armed forces has been progressively implemented since its democratization.

Conversely, Brazil is at the eye of the storm, not only because it once hosted President Mahmoud Ahmadinejad in Brasilia in 2009, but also because its own nuclear energy project has substantial military components. The same resources that Brazil uses for peaceful technologies could be used potentially for military nuclear programs. Indeed, while Brazil's nuclear plants are

for commercial use only, designed to enrich uranium to 3.5-5%, the Navy, in fact, developed its technology. A project directed by David Albright, in cooperation with the Brazilian Physics Society, indicated that the South American nuclear power could be capable of producing HEU (from 5% to 90%).<sup>80</sup>

Military interests are still very much vested in Brazil's nuclear program. The resistance to open the Resende plant for inspection is in direct response to the military's continuous involvement in nuclear policy. The Brazilian Navy had always wanted to develop a nuclear-powered submarine, for which uranium would have to be enriched to 20%. To date, civilian leaders appear to have conceded to this demand. In 2008, President Lula's National Defense Strategy called for the mastery of the complete nuclear fuel cycle and for the building of nuclear-powered submarines. The Brazilian government has designated its production facilities for nuclear submarine construction as restricted military areas, thus denying IAEA inspectors access to these facilities. This measure has effectively brought the military back into the Brazilian nuclear field.<sup>81</sup>

Brazil has made a deal with France, known as the ProSub program, which entails the joint construction of a nuclear-powered submarine. French officials say the program covers only non-nuclear components of the planned submersible, which then raises the possibility that Brazil would use locally enriched nuclear fuel to power the naval vessel once it is completed.<sup>82</sup> These local resources would most certainly come from recycled material derived from Brazilian nuclear plants. These recent moves have generated speculation over Brazil's plans. U.S. experts would prefer the South American country to refrain from so-called "dual use" technologies (atoms for peace that could be used for war), but Brazil might have something different in mind.

Consequently, there are substantial red areas that keep the U.S. government and the international community concerned about Latin America's nuclear future. Certainly, the level of threat in the Western Hemisphere is not nearly as dangerous as it is in the Middle East and Southeast Asia, where the fear of nuclear proliferation is much more obvious. But a de-nuclearized Latin America still has the potential for instability and uncertainty. Moreover, domestic politics dictate nuclear imperatives, and these are unlikely to be modified with external incentives.

## THE DOMESTIC SOURCES OF COOPERATION: SIGNS OF PROGRESS IN CHILE AND MEXICO

As described in the introduction, policies and attitudes vary within Latin America, with some countries cooperating more than others on nonproliferation issues. For example, Mexican and Chilean nuclear research reactors were controversial due to their reliance on uranium that could have been used for weapons-grade material. To minimize any risk of misuse, both governments publically committed to remove the material—HEU—from their territories during the 2010 Nuclear Security Summit in Washington. Chile went further by hosting regional outreach meetings in 2011 as a forum to collaboratively discuss nuclear security challenges in Latin America and share best practices from its conversion program.<sup>83</sup> Both countries could have accomplished their goals through simple bilateral agreements with the U.S.; however, they deliberately sought multilateral assistance by actively involving the IAEA in their respective nuclear conversion programs. To convert their research reactors from HEU to LEU, Mexico and Chile signed technical assistance agreements with the IAEA and invited Canadian nuclear experts.<sup>84</sup>

Furthermore, Mexico became the first Latin American country with nuclear plants to voluntarily sign the IAEA Additional Protocol in 2004. Chile, a member of the NAM, broke ranks with this group during the 2010 NPT conference by concluding agreements to implement the protocol in 2004. Not only have these countries allowed IAEA inspectors to visit their nuclear facilities, they have also requested experts from the Vienna-based organization to assess their energy capabilities and advise them on the expansion of nuclear power.<sup>85</sup> In recent years, they have signed almost all international treaties to control nuclear terrorism and the security of radioactive waste management. They joined the IAEA Board of Governors and applied for membership to the NSG.

Why have Chile and Mexico so eagerly embraced multilateral cooperation in nonproliferation matters? These states face similar, although not identical, geopolitical and strategic conditions as Argentina and Brazil, but they are not as skeptical towards the IAEA inspections regime. Neither can U.S. influence account altogether for this outcome. Chile and Mexico have developed cordial diplomatic relations with Washington, but they have not always unconditionally supported U.S. nuclear policies. Mexico was a harsh critic of the American nuclear détente policy throughout the Cold War era. During the 1990 NPT Review Conference, the Mexican delegation abstained from signing the final document—thus vetoing the final resolution—arguing that the U.S. and the other nuclear powers had failed to fulfill their international obligations and pursue disarmament. In 1994, Mexico led a coalition of 22 countries in the UN General Assembly to request an advisory opinion from the International

Court of Justice on the legality of nuclear weapons, which was seen as a way of exercising pressure against the nuclear powers. The Court's ruling was divided into seven decisions, one of which clearly sided with the Mexican view that countries like the U.S. had a "legal obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control."<sup>86</sup> Furthermore, Chile and Mexico were non-permanent members of the UN Security Council in 2003, and both were overwhelmingly opposed to supporting a resolution authorizing the use force against Iraq, much to the chagrin of President George W. Bush's administration. Instead, Chilean and Mexican diplomats sided with France and Russia in requesting more time for the IAEA to conclude their inspections.<sup>87</sup> Therefore, Latin American countries can be unresponsive to U.S. bilateral demands for nuclear cooperation.

What then explains the mostly cooperative attitudes of the Chilean and Mexican authorities? Once again, multiple domestic factors are in operation. A predominant view in the literature on Latin America's foreign policy argues that these countries have a mostly legalistic and principled approach towards international relations, with a tendency to negotiate disarmament and arms control agreements with legal means, on the basis of international public law.<sup>88</sup> Mexico, more so than Chile, has long been considered the region's nonproliferation norm entrepreneur, and has gained some morale stature in disarmament circles for its legal and principled views. This perspective, however, denies the fact that both countries have concrete national interests, and pursue specific and tangible goals when they cooperate with the U.S. and the IAEA.

A second school of thought previously discussed considers that economic strategies explain nonproliferation policies. Unlike Brazil and Argentina, Chile and Mexico have the most open and outward-oriented economies in Latin America. Their national economic strategies are dependent on commerce, and each has signed a plethora of free trade agreements with more than 47 countries worldwide. This, in turn, creates incentives for transparency and accountability, since foreign investors often seek stable and reliable markets.

In fact, there is evidence validating this form of thinking. In recent years, Mexico has emerged as Latin America's leading exporter, trading mostly semi-industrial and manufactured goods with the North American region. To some extent, Mexico's increased disposition to cooperate with the U.S. and the IAEA stems from business and commercial interests. Although nuclear energy production is a state endeavor, the industrial and business sectors have developed an interest in civilian nuclear technology, such as medical, scientific, and industrial applications of radiation, for which there is a large domestic market, especially in the area of health services. Mexican private entrepreneurs are thus increasingly interested in participating in the global

nuclear industry. Similarly, Mexico wants to be fully certified to partake in the “dual-use” regime (e.g., production of nuclear material that can be used for reactors as well as for military purposes), while maintaining a non-nuclear-weapon state status. After all, Mexico borders the U.S., which has the world’s largest military industrial complex and often requires nuclear-related supply. According to one official source, in 2011 alone, “Mexico exported over a billion dollars of dual-use goods that are regulated by the NSG control lists, including nuclear-quality steel and graphite, nuclear particle accelerators for medical and industrial uses; steam generators, microprocessors, capacitors, aluminum alloys, highly-specialized drilling equipment, and others.”<sup>89</sup> In other words, international cooperation has been sought deliberately to comply with and implement guidelines for nuclear-related exports; hence, the interest in joining the NSG (Mexico has the status of observer state) and voluntarily accepting international regulators. An open-door policy for IAEA inspectors certifies that Mexicans are not diverting nuclear material and provides a seal of approval to engage with U.S.-accredited nuclear suppliers and importers. As one diplomat argued during an interview, “We want to have all the appropriate checks in place to participate in the global market, while maintaining our historic commitment to the nonproliferation of nuclear weapons.”<sup>90</sup>

Chile appears to have followed a similar strategy, although for different reasons. As described above, Chile’s energy policy overwhelmingly relies on private initiative, competitive markets, and a subsidiary role for the state. If Chile were to build a nuclear plant, it would most likely be financed and constructed by private companies. But the Zanelli Commission did emphasize that while investment decisions would be made by the private sector, the government needed to take a more active role in monitoring development projects, assessing risk, and providing a strong regulatory framework.<sup>91</sup> In this context, the interest in cooperating with the IAEA, participating in NSG meetings, ratifying international treaties and the Additional Protocol is part of a long-term strategy that aims to secure Chile’s options once a decision is made. A high-ranked diplomat best explained the strategy as follows: “We want to be in every international body regulating nuclear energy projects. So when the time comes to make a decision (and if a decision is ever made), we will have a long, inclusive, certified, and reliable list of international nuclear suppliers at our disposition, ready to invest and build in our country.”<sup>92</sup>

Therefore, internationally oriented policies do provide strong incentives to comply and cooperate with the nonproliferation regime. Comparatively speaking, Mexican and Chilean nuclear energy programs are less nationalistic, autarkic, and dependent on state and public interests than the Argentine and Brazilian projects. This condition, however, generates inherent internal limitations as well, since it makes Chile and Mexico dependent on external assistance,

ultimately undermining their overarching goal of becoming self-sufficient and energy independent.

Nevertheless, to think that only economic interests drive nuclear energy policies is reductionist and denies the many political interests these states hold. Again, if economic strategies were the sole engines, then bilateral economic agreements with potential nuclear supplies (such as the U.S.) would suffice. Surprisingly, Chile and Mexico pursued mostly multilateral arrangements with the IAEA. Political imperatives are thus needed to explain this multilateral strategy.

Indeed, there is a history of anti-American sentiments in Latin American foreign policy that tends to be politically resistant to any form of direct intervention and extremely sensitive to sovereignty issues. Chile and Mexico are no exception to this rule. National governments may be sympathetic to Washington concerns, but their support is limited by public opinion, attitudes from opposing legislators, and anti-American interest groups (such as Communist parties and some segments of the extreme left). The appearance of being too close or cozy with the U.S. could be easily interpreted as an international intrusion on sovereignty. Since international agreements require legislative ratification, any attempt to sign a bilateral agreement with Washington on nuclear policy is a political target, subject to domestic dispute and even objection. By contrast, a multilateral policy diffuses these concerns domestically and allows politicians to ensure ratification by presenting agreements as cooperative efforts with international organizations. Multilateralism minimizes the natural tendency to see nuclear agreements as undermining sovereignty because their adhesion is voluntary. It is the states that voluntarily grant access to IAEA rather than U.S. officials requesting or demanding sensitive information. Hence, multilateralism is the preferred strategy for states that have close relations with Washington, but face domestic constraints.

Furthermore, multilateralism helps authorities to legitimize domestic policies that remain highly controversial. This is particularly true in both Chile and Mexico, where nuclear energy is contentious. The debate over nuclear power in Latin America is inherently complex, but one important factor is public opinion, which matters substantially for countries that have recently experienced democratization processes. There are no cross-national surveys available on public opinion towards nuclear power in the region, although a recent poll, conducted among 24 countries around the world after the Fukushima Daichi nuclear accident, indicated that citizens in Argentina, Brazil, and Mexico remain opposed to nuclear energy (see table below). Moreover, of all 24 countries surveyed (including Japan), Mexico had the least support for nuclear power in the world, with substantial majorities “strongly opposing” nuclear energy. The most anti-nuclear nations in the poll, at about 80% against, were Italy, Germany, and Mexico. Only Italy and



Turkey had a larger percentage majority of interviewees strongly opposing nuclear power than Mexico (61%, 56%, and 52% respectively) and only these countries had more than 50% strongly opposing the nuclear option. This can be interpreted as reinforcing Mexico's national identity as the leader of nonproliferation and nuclear disarmament in Latin America. However, these survey results must be taken cautiously since they were taken in 2011, after one of the most devastating nuclear plant disasters. Mexican public attitudes might have been influenced by the fact that the country is earthquake prone, and people fear that similar nuclear accidents might one day occur in Mexico. The Laguna Verde plant operates with a similar technology as the one in Fukushima; both are located in earthquake-prone territories, with boiling-water reactors (although most Mexican are probably unaware of these details.)

**Figure 3: Support for nuclear power in after the Fukushima Plant Accident (sample countries), 2011**

<b>Support for nuclear power/Country</b>	India	U.S.	Germany	Turkey	Italy	Argentina	Brazil	Mexico
Strongly support	28%	19%	5%	11%	6%	10%	10%	4%
Somewhat support	33%	33%	16%	18%	13%	18%	22%	14%
Somewhat oppose	23%	31%	28%	15%	20%	26%	24%	29%
Strongly oppose	16%	17%	51%	56%	61%	46%	45%	52%

*Source:* "Global Citizen Reaction to the Fukushima Nuclear Plant Disaster," IPSOS, June 2011, available at: <http://www.ipsos-mori.com/researchpublications/researcharchive/2817/Strong-global-opposition-towards-nuclear-power.aspx> (accessed 21 September 2012).

On the other hand, there are no public opinion surveys on attitudes towards nuclear power in Chile, but state authorities acknowledge that Japan's nuclear disaster makes it increasingly difficult to sell any nuclear energy ideas to voting citizens. According to Sebastián Bernstein, the former director for the National Energy Commission, the acceptance of nuclear energy will become more difficult at a public level in Chile.<sup>93</sup> This is happening precisely when the current government is already facing intensified opposition from environmental groups, who have blocked, in court, the construction of a dam project in Patagonia.<sup>94</sup> A decision to develop a nuclear plant is thus likely to mobilize, if not energize, the opposition.

This is not to say that public opinion does not matter in Argentina and Brazil. It certainly does, and several social movements in South America have mobilized against nuclear energy. However, the domestic and legislative constraints faced by the governments of Buenos Aires and Brasilia are different from those confronted by Santiago or Mexico City. The government of President Cristina Fernández de Kircher holds a congressional majority and controls the legislative agenda. The nuclear submarine project in Brazil is subject to national security clauses that prevent any public, legislative discussion on the matter. By contrast, Mexico has had a divided government; no single political party has held a legislative majority since 1997. The Chilean political system remains polarized between the left and the right, making political compromise difficult, especially during elections.

Once again, this makes multilateralism particularly appealing for Chilean and Mexican authorities. The fears of political polarization are diffused when decisions and agreements are presented as part of a foreign policy strategy rather than a national energy policy. Having international organizations, such as the IAEA, certify and clear nuclear energy projects placates domestic concerns about safety. International compliance thus depoliticizes highly controversial domestic policy issues and facilitates ratification. In other words, multilateralism internationalizes domestic policies and allows governments to pass legislation (legal framework) as part of an international compromise negotiated with a legitimate international body. Hence, adherence to the IAEA Additional Protocol was presented as a measure consistent with Mexico's long nuclear disarmament tradition, even if such policy involved intrusive international safeguards. Chilean authorities can claim that their national energy plans have been properly vetted by experts from acclaimed international agencies, thus off-putting domestic opponents.

## **CONCLUSION**

The need for energy resources has brought new focus on nuclear power in Latin America, but its revival faces political, security, and practical challenges for the region, the U.S., and the international community. Nuclear energy in the Western Hemisphere has never been uncontroversial. After all, it was in Latin America where the challenges of nuclear safety, security, and proliferation became plainly manifest for the first time during the 1962 Cuban

missile crisis. The frameworks currently in operation—the nuclear-weapon free zone and ABACC—successfully averted a nuclear arms race, but they seem insufficient to deal with current challenges. Certainly, compared to Japan, Iran, and North Korea, Latin America’s nuclear security insufficiencies appear minor. Nevertheless, more reactors in Argentina, Brazil or Mexico, the arrival of newcomers (such as Chile), and the increased activity of non-state actors (be them terrorists, traffickers, or private companies) will only increase the complexity of nuclear power and the inherent risks.

The evidence here presented emphasized that—with the exception of Brazil—there is a strong regional consensus against nuclear weapons. Latin American states, however, strongly differ on how to minimize the risks of nuclear proliferation, diversion, and terrorism. Brazil, and to a lesser extent Argentina, are opposed to the inspection regime and wish to minimize international intrusion. On the other hand, Chile and Mexico have a mutual interest to transcend sovereignty, open their nuclear programs for inspection, and work effectively with the international nuclear safeguards system. Therefore, these four countries represent two diametrically opposed models for nuclear development in Latin America. The remaining question is which model will prevail in the region: autarky or international cooperation?

Another finding of this study revolves around the incentives for nuclear cooperation or defiance. The cases analyzed here suggest that in Latin America the incentives are largely determined by domestic factors, including economic strategies, civil-military relations, foreign policy imperatives, and political coalitions. Moreover, the evidence confirms the hypothesis that countries with open markets and contested political systems will comply with international nuclear standards on their own, without requiring intrusive U.S. persuasion or bilateral pressures.

This should be a promising sign for U.S. nonproliferation efforts. Countries with open economic strategies and political conditions similar to those of Chile and Mexico will tend to be cooperative. Domestic politics, however, impose constraints and limits on what the U.S. can and cannot do in Latin America. A reversal in domestic politics and in economic strategies can lead to a very different outcome. If this were to take place, Washington would have few options available to modify incentives. As the Argentine and Brazilian case suggests, the most U.S. diplomats can do is raise concerns in multilateral forums and wait until a new domestic

environment modifies policy preferences. Global suspicion about Brazil's motivations may convince Brazilian authorities to comply in the long run. On the other hand, granting exceptions and special concessions—of the kinds offered to India and ABACC—will ultimately undermine the nonproliferation regime.

## WORKS CITED

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<sup>1</sup> See, for example, Simon Romero, “Economies in Latin America Race Ahead,” in *The New York Times*, 30 June 2010, available at: <http://www.nytimes.com/2010/07/01/world/americas/01peru.html> (accessed 14 September 2012).

<sup>2</sup> The non-proliferation regime is made of a plethora of international treaties and agreements, including the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the International Atomic Energy Agency (IAEA), the Comprehensive Test Ban Treaty (CTBT), the Nuclear Suppliers Group (NSG), the Missile Technology Control Regime, the International Convention on the Suppression of Acts of Nuclear Terrorism, Partial Test Ban Treaty (PTBT), and nuclear free zones (known as the Treaty of Tlatelolco).

<sup>3</sup> On the absence of nuclear proliferators in Latin America, see Harold A. Trinkunas, “Assessing Potential Nuclear Proliferation Networks in Latin America: 2006-2016,” *Nonproliferation Review* 13, no. 3 (November 2006): 617-625.

<sup>4</sup> For a description of the “new nuclear age” see James E. Doyle, “Introduction: Nuclear Security in the Twenty-First Century,” in James E. Doyle (ed.) *Nuclear Safeguards, Security and Nonproliferation* (New York: Butterworth-Heinemann Publishers, 2008): 3-4.

<sup>5</sup> See Ariel E. Levite, “Never Say Never Again: Nuclear Reversal Revisited,” *International Security* 27, no. 3 (Winter 2002/03): 315.

<sup>6</sup> See IAEA Power Reactor Information System, “Countries: Electricity Production Share 2011,” Vienna, available at: <http://www.iaea.org/PRIS/CountryStatistics/CountryStatisticsLandingPage.aspx> (accessed on 15 September 2012).

<sup>7</sup> See Irma Argüello, *La Energía Nuclear en América Latina: Entre el Desarrollo Económico y los Riesgos de Proliferación*, NPSGlobal, Fall 2010, available at: <http://npsglobal.org/esp/analisis/1101-energia-nuclear-america-latina-desarrollo-economico-riesgos-proliferacion-irma-arguello.html> (accessed 15 September 2012).

<sup>8</sup> See Monica Serrano, “Brazil and Argentina,” in Mitchell Reiss and Robert S. Litwak (eds.) *Nuclear Proliferation after the Cold War*. (Baltimore, Maryland: Johns Hopkins University Press, 1994), 237.

<sup>9</sup> Etel Solingen, “Macropolitical Consensus and Lateral Autonomy in Industrial Policy: The Nuclear Sector in Brazil and Argentina,” *International Organization* 47, no. 2 (Spring 1993), 263-298; and Etel Solingen, *Industrial Policy, Technology, and International Bargaining: Designing Nuclear Industries in Argentina and Brazil*. (Palo Alto: Stanford University Press, 1996.)

<sup>10</sup> José Goldemberg, “Brazil.” In Jozef Goldblat (ed.), *Non-proliferation: The Why and the Wherefore* (London: Taylor & Francis, 1985), 81-87.

<sup>11</sup> Quote obtained from John Redick, *Military Potential of Latin American Nuclear Energy Programs* (Beverly Hills, California: Sage Publications, Inc., 1972), 31.

<sup>12</sup> See article V of the Nonproliferation Treaty, which reads as follows: “Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.”

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<sup>13</sup> See Espil, Emmanuel Adler, *The Power of Ideology: The Quest for Technical Autonomy in Argentina and Brazil*. Berkeley, California: University of California Press, 1991; and Jorge A. Aja Espil, “Argentina.” In Jozef Goldblat (ed.) *Non-proliferation: The Why and the Wherefore*. London: Taylor & Francis, 1985), 73-76.

<sup>14</sup> Jeffrey A. Frieden, *Debt, Development, and Democracy: Modern Political Economy and Latin America, 1965-1985* (Princeton, New Jersey: Princeton University Press, 1991), 180-182.

<sup>15</sup> John R. Redick, *Military Potential of Latin American Nuclear Energy Programs*, 31.

<sup>16</sup> See Sharon Squassoni, “Nuclear: Latin American Revival,” in Carnegie Endowment for International Peace, Washington, D.C., Winter 2009, available at: <http://www.carnegieendowment.org/2009/02/17/nuclear-latin-american-revival/fhc> (accessed 15 September 2012).

<sup>17</sup> Ibid.

<sup>18</sup> As quoted in Michael S. Lerner, “In Latin America, Nuclear Power on Shaky Ground,” in *World Policy*, 14 May 2012, available at: <http://www.worldpolicy.org/blog/2012/05/14/latin-america-nuclear-power-shaky-ground> (accessed 10 September 2012).

<sup>19</sup> See Associated Press, “Millions left in dark by Brazilian blackout,” in *The Guardian*, 11 November 2009, available at: <http://www.guardian.co.uk/world/2009/nov/11/itaipu-blackout-hits-brazil> (accessed 14 September 2012).

<sup>20</sup> See Marcos C. de Azambujá, “A Brazilian Perspective on Nuclear Disarmament,” in Barry M. Blechman (ed.), *Brazil, Japan, and Turkey* (The Henry L. Stimson Center: Washington, D.C., 2009), 9-10.

<sup>21</sup> See Paulo Winterstein, “Brazil Angra 3 Nuclear Plant Startup Date Pushed to 2016,” in *The Wall Street Journal*, 17 July 2012, available at: <http://online.wsj.com/article/BT-CO-20120717-711970.html> (accessed 12 September 2012).

<sup>22</sup> See Stephanie Hanson, “Energy Bottlenecks in South America,” Council on Foreign Relations, New York, 21 April 2008, available at: <http://www.cfr.org/energy/energy-bottlenecks-south-america/p16037> (accessed 15 September 2012.)

<sup>23</sup> See “Argentina: Overview,” in Nuclear Threat Initiative (NTI), Washington, D.C., August 2012, available at: <http://www.nti.org/country-profiles/argentina/> (accessed 15 September 2012).

<sup>24</sup> See The Economist, “Chile: Lessons from the students. How to stop a middle-class revolt from derailing a successful development model,” in *The Economist*, 14 April 2012, available at: <http://www.economist.com/node/21552573> (accessed 14 September 2012).

<sup>25</sup> See Irma Argüello, *La Energía Nuclear en América Latina: Entre el Desarrollo Económico y los Riesgos de Proliferación*.

<sup>26</sup> For an analysis of Chile’s energy status, see “Chile: Energy Policy Review 2009,” IAE, Vienna Austria, 2009.

<sup>27</sup> See “Copper pushes Chile closer to the nuclear energy option,” in MercoPress, 12 December 2007, available at: <http://en.mercopress.com/2007/12/12/copper-pushes-chile-closer-to-the-nuclear-energy-option> (accessed 15 September 2012).

<sup>28</sup> On Chile’s energy alternatives and viabilities, see “Evaluating Nuclear Energy Possibilities: Belarus, Chile, Turkey and Vietnam,” document elaborated by Ux Consulting, Roswell, Georgia, April 2008, 33-42.

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<sup>29</sup> See Carlos Escudé, "An Introduction to Peripheral Realism and Its Implications for the Interstate System: Argentina and the Condor II Missile Project," in Stephanie G. Neuman (ed.), *International Relations Theory and the Third World*, (New York: St. Martin's Press, 1995), 55-70.

<sup>30</sup> See David Albright, "Bomb Potential for South America," in *Bulletin of the Atomic Scientists*, (May 1989), 16-20; and Michael Barletta, "The Military Nuclear Program in Brazil," paper published by the Center for International Security and Arms Control of Stanford University, Palo Alto, California, August 1997, available at: [http://cisac.stanford.edu/publications/military\\_program\\_in\\_brazil\\_the](http://cisac.stanford.edu/publications/military_program_in_brazil_the) (accessed 17 September 2012); and Marcos C. de Azambujá, "A Brazilian Perspective on Nuclear Disarmament" 5-7.

<sup>31</sup> Los Angeles Times, "Brazil Probe Finds a Bomb-Plan," *The Los Angeles Times* (7 December 1990): 2. See also Comissão Parlamentar Mista de Inquérito Destinada a Apurar o Programa Autônomo de Energia Nuclear, Também Conhecido como "Programa Paralelo" (Parliamentary Mixed Commission of Inquiry for the Autonomous Program on Nuclear Energy, also known as the "Parallel Program"), Relatório (Report) No. 13, Brasília, Brazil, 1990. For more information on Brazil's military nuclear project see Jean Krasno, "Non-proliferation: Brazil's Secret Nuclear Program," *Orbis: A Journal of World Affairs* 38, no. 3 (Summer 1994): 425-436.

<sup>32</sup> For more detail on the nuclear rapprochement see João Resende-Santos, "The Origins of Security Cooperation in the Southern Cone," in *Latin American Politics and Society* 44, no. 4 (December 2002): 89-126; Paul L. Leventhal and Sharon Tanzer, *Averting a Latin American Nuclear Arms Race: New Prospects and Challenges for Argentine-Brazilian Nuclear Cooperation*. New York: St. Martin's Press, 1992; Wayne A Selcher, "Brazilian-Argentine Relations in the 1980s: From Wary Rivalry to Friendly Competition," *Journal of Interamerican Studies and World Affairs* 27, no. 2 (1985), 25-53.

<sup>33</sup> See Ariel E. Levite, "Never Say Never Again: Nuclear Reversal Revisited," 317.

<sup>34</sup> There is a large body of literature that addresses the foundation and establishment of ABACC, see for instance Michael Barletta, "Democratic Security and Diversionary Peace: Nuclear Confidence-Building in Argentina and Brazil," paper for deliver at the 1998 meeting of the Latin American Studies Association, The Palmer House Hilton Hotel, Chicago, Illinois, September 24-26, 1998; Julio César Carasales, *De Rivaletas a Socios: El proceso de cooperación nuclear entre Argentina y Brasil* (Buenos Aires, Argentina: Grupo Editorial Latinoamericano, 1997); Javier Corrales, "Regimes of Cooperation in the Western Hemisphere: Power, Interests, and Intellectual Traditions," *International Studies Quarterly* 43, no. 1 (May 1999): 1-36; Andrew Hurrell, "Security in Latin America," *International Affairs* 74, no. 3 (1998): 210-233; Andrew Hurrell, "Emerging Security Community in South America?" in Emanuel Adler and Michael Barnett (eds.), *Security Communities*, eds., Cambridge: Cambridge University Press, 1998), 243-245; Jeffrey W. Knopf, "The Importance of International Learning," *Review of International Studies* 29, no. 2 (2003): 187-207; John R. Redick, Julio C. Carasales, and Paulo S. Wrobel, "Nuclear Rapprochement: Argentina, Brazil, and the Nonproliferation Regime," *The Washington Quarterly* 18, no. 1 (Winter 1995): 107-122; Mónica Serrano, "Brazil and Argentina," in Mitchell Reiss and Robert S. Litwak (eds.), *Nuclear Proliferation after the Cold War* (Washington, D.C.: Woodrow Wilson Center Press, 1994): 231-255; Arturo C. Sotomayor, "Civil-Military Relations and Security Institutions in the Southern Cone: The Sources of Argentine-Brazilian Nuclear Cooperation," in *Latin American Politics and Society* 46, no. 4 (Winter 2004): 29-60; Paul S. Wrobel, "From Rivals to Friends: The Role of Public Declarations in Argentine-Brazilian Rapprochement," in Michael Krepon, Jenny S. Dreizin, and Michael Newbill (eds.), *Declaratory Diplomacy: Rhetorical Initiatives and Confidence Building* (Washington, D.C.: Report of The Henry L. Stimson Center, 1999), 135-151, available at: <http://www.stimson.org/?SN=ME20011221185#> (accessed 15 September 2012).

<sup>35</sup> Rodrigo V. Álvarez, "Why Latin America Matters at the Nuclear Security Summit," in *Bulletin of the Atomic Scientists*, 16 February 2012, available at: <http://www.thebulletin.org/web-edition/columnists/fissile-materials-working-group/why-latin-america-matters-the-nuclear-security> (accessed 17 September 2012).

<sup>36</sup> See James E. Doyle, "Introduction: Nuclear Security in the Twenty-First Century," 10.

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- <sup>37</sup> Nuclear security is “a concept that entails making sure that the material is secure against diversion or theft.” Security involves “an interplay among a set of factors: potential attackers or saboteurs, vulnerabilities to the facility, and ways the attackers or saboteurs may breach defense and exploit those vulnerabilities.” See Charles D. Ferguson, *Nuclear Policy: What Everyone Needs to Know* (New York: Oxford University Press, 2011), 173.
- <sup>38</sup> See Siobhan Gorman, “Patagonia Crime Scene Plays Role in Nuclear-Security Bid,” in *The Wall Street Journal*, 9 October 2009, available at: <http://online.wsj.com/article/SB125504219290974603.html> (accessed 17 September 2012).
- <sup>39</sup> See Emilio Godoy, “Mexico Lacks Control of Radioactive Sources, Faces Problems of ‘Orphan Sources’,” in Nuclear Threat Initiative, Washington D.C., 25 April 2012, available at: <http://www.nti.org/analysis/articles/mexico-lacks-control-radioactive-sources-faces-problem-orphan-sources/> (accessed 17 September 2012).
- <sup>40</sup> National Journal, “Uranium Ore Seized in Brazil,” in *NTI Global Security Newswire*, 26 January 2010, available at: <http://www.nti.org/analysis/articles/brazil-450-kg-uranium-ore-seized-amapa/> (accessed 21 September 2012).
- <sup>41</sup> See Christine Folch, “Trouble in the Triple Frontier: The Lawless Border Where Argentina, Brazil, and Paraguay Meet,” in *Foreign Affairs*, 6 September 2012, available at: <http://www.foreignaffairs.com/articles/138096/christine-folch/trouble-on-the-triple-frontier> (accessed 17 September 2012).
- <sup>42</sup> See for instance Alexei Barrionuevo, “Inquiry on 1994 Blast at Argentina Jewish Center Gets New Life,” in *The New York Times*, 17 July 2009, available at: <http://www.nytimes.com/2009/07/18/world/americas/18argentina.html?pagewanted=all> (accessed on 17 September 2012).
- <sup>43</sup> Alex Sánchez, “The Dirty Little Secret: Nuclear Security Issues in Latin America and the Caribbean,” in Council on Hemispheric Affairs, 6 January 2010, available at: <http://www.coha.org/nuclear-security-issues-in-latin-america-and-the-caribbean/> (accessed on 17 September 2012).
- <sup>44</sup> Etel Solingen, “Hindsight and Foresight in South American Nonproliferation Trends in Argentina, Brazil, and Venezuela,” in James J. Wirtz and Peter R. Lavoy (eds.), *Over the Horizon Proliferation Threats* (Palo Alto: Stanford University Press, 2012), 145.
- <sup>45</sup> Associated Press, “Powell expects Brazil, IAEA to agree,” published in *USA Today*, 5 October 2004, available at: [http://www.usatoday.com/news/world/2004-10-05-brazil-nuclear-plans\\_x.htm](http://www.usatoday.com/news/world/2004-10-05-brazil-nuclear-plans_x.htm) (accessed 18 September 2012).
- <sup>46</sup> For a detailed analysis of the IAEA Additional Protocol see Theodore Hirsch, “The IAEA Additional Protocol: What It Is and Why It Matters,” in *The Nonproliferation Review* 11, no. 3 (Fall-Winter 2004): 140-166.
- <sup>47</sup> James E. Doyle, “Introduction: Nuclear Security in the Twenty-First Century,” 7.
- <sup>48</sup> See Mark Hibbs, “The Unspectacular Future of the IAEA Additional Protocol,” in Carnegie Endowment for International Peace, Washington, D.C., 26 April 2012, available at: <http://carnegieendowment.org/2012/04/26/unspectacular-future-of-iaea-additional-protocol#> (accessed on 17 September 2012).
- <sup>49</sup> See Diego Santos Vieira de Jesus, “The Brazilian Way,” in *Nonproliferation Review* 17, no. 3 (November 2010): 558.
- <sup>50</sup> National Journal, “Scientist Says Brazil Has Right to Nuclear Secrets,” in *NTI Global Security Newswire*, 8 April 2004, available at: <http://www.nti.org/gsn/article/scientist-says-brazil-has-right-to-nuclear-secrets/> (accessed 20 September 2012).
- <sup>51</sup> See Mark Hibbs, “Nuclear Suppliers Group and the IAEA Additional Protocol,” the Carnegie Endowment for International Peace, Washington, D.C., 18 August 2010, available at:



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<http://www.carnegieendowment.org/2010/08/18/nuclear-suppliers-group-and-iaea-additional-protocol/ep> (accessed on 17 September 2011). See also, “When nuclear sheriffs quarrel: The job of keeping sensitive materials away from pariah was always hard- and now it’s marred by squabbles,” *The Economist*, 30 October 2008, available at: [http://www.economist.com/node/12516611?story\\_id=12516611](http://www.economist.com/node/12516611?story_id=12516611) (accessed on 17 September 2012).

<sup>52</sup> Mark Hibbs, “Nuclear Suppliers Group and the IAEA Additional Protocol.”

<sup>53</sup> See Marcos Marzo, “Additional Protocol: logic and impact,” Brazilian-Argentine Agency for Accounting and Control of Nuclear Energy: Working Paper, available at: [http://www.abacc.org.br/wp-content/uploads/2012/01/Additional-Protocol\\_Marzo.pdf](http://www.abacc.org.br/wp-content/uploads/2012/01/Additional-Protocol_Marzo.pdf) (accessed on 17 September 2012).

<sup>54</sup> See Joelien Pretorius, “Nuclear politics of denial: South Africa and the Additional Protocol,” paper presented at the 2012 International Studies Association Annual Meeting, San Diego, March 16-19, 2012.

<sup>55</sup> Mark Hibbs, “Nuclear Suppliers Group and the IAEA Additional Protocol.”

<sup>56</sup> See Diego Santos Vieira de Jesus, “The Brazilian Way,” in *Nonproliferation Review*, 558.

<sup>57</sup> There is an abundant literature on Brazil’s aspiration to join permanently the UN Security Council. See for instance Eugênio Vargas Garcia, “A candidatura do Brasil a um assento permanente no Conselho da Liga das Nações,” *Revista Brasileira de Política Internacional* 37, no. 1 (1994), 5-23; Arthur Pereira and Oliveira Filho, “O Brasil e o Conselho de Segurança da ONU: Revelações Vinte Anos Depois,” *Parceiras Estratégicas*, no. 5 (September 1998), 94-120; Celso Amorim, “O Brasil e o Conselho de Segurança das Nações Unidas, *Política Externa* 3, no. 4 (March 1995), 3-15; Edmundo Sussumu Fujita, “O Brasil e o Conselho de Segurança: Notas Sobre Uma Década de Transição, 1985-1995,” *Parcerias Estratégicas*, no. 2 (December 1996), 95-119; Virgílio Caixeta Arraes, “O Brasil e o Conselho de Segurança das Nações Unidas: dos anos 90 a 2002,” *Revista Brasileira de Política Internacional* 48, no. 2 (2005), 152-168.

<sup>58</sup> See Peter Baker, “Senate Approves Indian Nuclear Deal,” in *The New York Times*, October 1, 2008, <http://www.nytimes.com/2008/10/02/washington/02webnuke.html?ref=nuclearprogram> (accessed 15 September 2012).

<sup>59</sup> See Alexei Barrionuevo, “Brazil and Turkey Near Nuclear Deal With Iran,” in *The New York Times*, May 16, 2010, <http://www.nytimes.com/2010/05/17/world/middleeast/17iran.html> (accessed 18 September 2012).

<sup>60</sup> See Simon Romero and Jackie Calmes, “Brazil and U.S. Accentuate the Positive,” in *The New York Times*, 9 April 2010, available at: <http://www.nytimes.com/2012/04/10/world/americas/in-dilma-rousseff-visit-brazil-and-us-accentuate-positive.html> (accessed 18 September 2012).

<sup>61</sup> See The Economist, “Dilma Rousseff’s visit to America: Our Friends in the South,” in *The Economist*, 7 April 2012, available at: <http://www.economist.com/blogs/democracyinamerica/2012/04/dilma-rousseffs-visit-america?page=9> (accessed 19 September 2012).

<sup>62</sup> Simon Romero and Jackie Calmes, “Brazil and U.S. Accentuate the Positive.”

<sup>63</sup> See Nicole Gaouette, “U.S. Not Encouraged by India, South Africa, Brazil at UN,” in Bloomberg New, 12 September 2011, available at: <http://www.bloomberg.com/news/2011-09-13/south-africa-brazil-india-fail-to-impress-u-s-with-their-un-performance.html> (accessed on 20 September 2012).

<sup>64</sup> Etel Solingen, “Hindsight and Foresight in South American Nonproliferation Trends in Argentina, Brazil, and Venezuela,” 144.

<sup>65</sup> Global Security Newswire, “Argentina Relaunches Uranium Enrichment Plant,” in *Nuclear Threat Initiative*, 26 October 2010, available at: <http://www.nti.org/gsn/article/argentina-relaunches-uranium-enrichment-plant/> (accessed 18 September 2012).

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- <sup>66</sup> See Pavel Podvig, "Argentina reopens its Pilcaniyeu uranium enrichment plant," *International Panel of Fissile Materials Blog*, 25 October 2010, available at: [http://fissilematerials.org/blog/2010/10/argentina\\_reopens\\_its\\_pil.html](http://fissilematerials.org/blog/2010/10/argentina_reopens_its_pil.html) (accessed 19 September 2012).
- <sup>67</sup> Maria Rost Rublee, "The Nuclear Threshold States: Challenges and Opportunities Posed by Brazil and Japan," *Nonproliferation Review* 17, no. 1 (March 2010): 49.
- <sup>68</sup> Mark Hibbs, "Nuclear Suppliers Group and the IAEA Additional Protocol."
- <sup>69</sup> Olivier Stuenkel, "Brazil Should Act on Nuclear Transparency," *World Politics Review*, 20 October 2010, available at: <http://www.worldpoliticsreview.com/articles/6776/brazil-should-act-on-nuclear-transparency> (accessed 18 September 2012).
- <sup>70</sup> Marcos C. de Azambujá, "A Brazilian Perspective on Nuclear Disarmament," 11.
- <sup>71</sup> Arturo C. Sotomayor, "Civil-Military Relations and Security Institutions in the Southern Cone: The Sources of Argentine-Brazilian Nuclear Cooperation."
- <sup>72</sup> Mónica Hirst, "Security Policies, Democratization, and Regional Integration in the Southern Cone," *International Security and Democracy: Latin America and the Caribbean in the Post-Cold War Era*. ed. Jorge Domínguez. (Pittsburgh: University of Pittsburgh Press, 1995), 106.
- <sup>73</sup> See National Journal, "Brazil Needs Nukes, VP Says," published in *NTI Global Security Newswire*, 28 September 2009, available at: <http://www.nti.org/gsn/article/brazil-needs-nukes-vp-says/> (accessed 18 September 2012).
- <sup>74</sup> Ibid.
- <sup>75</sup> See The Economist, "Brazil's army: But what is it for? A philosopher redesigns an army," *The Economist*, 15 January 2009, available at: <http://www.economist.com/node/12936593> (accessed 18 September 2012).
- <sup>76</sup> Oliver Stuenkel, "Brazil Should Act on Nuclear Transparency."
- <sup>77</sup> See for instance National Journal, "Some Experts See Brazil on Nuclear Path Akin to Iran," in *NTI Global Security Newswire*, 21 April 2006, available at: <http://www.nti.org/gsn/article/some-experts-see-brazil-on-nuclear-path-akin-to-iran/> (accessed 20 September 2012).
- <sup>78</sup> "Iran-Venezuelan Bond Poses Threat: U.S. General," in *NTI Global Security Newswire*, 6 April 2011, available at: <http://www.nti.org/gsn/article/iranian-venezuelan-bond-poses-threat-us-general/> (accessed 18 September 2012).
- <sup>79</sup> See Irma Argüello, *La Energía Nuclear en América Latina: Entre el Desarrollo Económico y los Riesgos de Proliferación*.
- <sup>80</sup> Quoted in *National Journal*, "Some Experts See Brazil on Nuclear Path Akin to Iran."
- <sup>81</sup> For an assessment of Brazil's nuclear program, see, for example, Hans Rühle, "Nuclear Proliferation in Latin America: Is Brazil Developing the Bomb?" *Spiegel Online*, 7 May 2010, <http://www.spiegel.de/international/world/0,1518,693336,00.html> (accessed on 18 September 2012); and "Nuclear Power in Brazil," in *World Nuclear Association*, May 2012, available at: <http://www.world-nuclear.org/info/inf95.html> (accessed on 19 September 2012).
- <sup>82</sup> See "Security industry: Brazil's nuclear plans stir up debate," published in *UPI*, 30 November 2011, available at: [http://www.upi.com/Business\\_News/Security-Industry/2011/11/30/Brazils-nuclear-plans-stir-up-debate/UPI-27811322687019/](http://www.upi.com/Business_News/Security-Industry/2011/11/30/Brazils-nuclear-plans-stir-up-debate/UPI-27811322687019/) (accessed 18 September 2012).

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<sup>83</sup> See Bureau of International Security and Nonproliferation, “Nuclear Security Seminar in Chile,” U.S. Department of State, 24 June 2011, available at: <http://www.state.gov/t/isn/rls/prsrl/166986.htm> (accessed 20 September 2012).

<sup>84</sup> See CBC News World, “Canada in hot seat at nuclear summer for uranium use,” in *CBC News*, 26 March 2012, available at: <http://www.cbc.ca/news/world/story/2012/03/26/obama-north-korea.html> (accessed 20 September 2012); and Gobierno de Chile, “President Piñera calls for ‘improvements in nuclear security standards and parameters’ during the Summit in Korea,” Government of Chile, Santiago, 27 March 2012, available at: <http://www.gob.cl/english/featured/2012/03/27/president-pinera-calls-for-improvements-in-nuclear-security-standards-and-parameters-during-the-summ.htm> (accessed 20 September 2012).

<sup>85</sup> See reports released by the IAEA: “Chile: Energy Policy Review 2009,” IAE, Vienna Austria, 2009; and “Comparative assessment of energy options and strategies in Mexico until 2025: Final report of a coordinated research project 2000-2004,” Vienna Austria, October 2004.

<sup>86</sup> See International Court of Justice, “Legality of the Use by a State of Nuclear Weapons in Armed Conflict, The Hague, 8 July 1996, available at: <http://www.icj-cij.org/docket/index.php?p1=3&p2=4&k=e1&p3=4&case=95> (accessed on 20 September 2012).

<sup>87</sup> See Monica Serrano and Paul Kenny, “Iraq and World Order: A Latin American Perspective,” in Ramesh Thakur and Waheguru Pal Singh Sidhu (eds.), *The Iraq Crisis and World Order: Structural, Institutional and Normative Changes* (New York: United Nations University Press, 2006), 298-312.

<sup>88</sup> See, for instance, Arie M. Kacowicz, *The Impact of Norms in International Society: The Latin American Experience, 1881-2001* (Notre Dame, Indiana: University of Notre Dame Press, 2005).

<sup>89</sup> See Ministry of Foreign Affairs’ Press Release, “The Nuclear Suppliers Group Admits Mexico as an Observer State,” Foreign Ministry, Mexico City, 21 June 2012, available at: [http://www.sre.gob.mx/en/index.php?option=com\\_content&view=article&id=1575:the-nuclear-suppliers-group-admits-mexico-as-an-observer-state&catid=27:archives&Itemid=64](http://www.sre.gob.mx/en/index.php?option=com_content&view=article&id=1575:the-nuclear-suppliers-group-admits-mexico-as-an-observer-state&catid=27:archives&Itemid=64) (accessed on 20 September 2012).

<sup>90</sup> Personal interview with Mexican diplomat, Vienna, Austria, 2 July 2012.

<sup>91</sup> See IAEA: “Chile: Energy Policy Review 2009,” 63-65.

<sup>92</sup> Personal interview with Chilean diplomat, Vienna, Austria, 4 July 2012.

<sup>93</sup> See El Mercurio, “Chile: Aceptación de energía nuclear se hará más difícil a nivel de opinión pública,” published by the Corporación Nuclear Eléctrica, Santiago, Chile, 2011, available at: <http://www.cnechile.cl/?p=2062> (accessed 21 September 2012).

<sup>94</sup> See Camila Ruiz, “Chilean court rejects opposition to Patagonia dam,” in *The Guardian*, 5 April 2012, available at: <http://www.guardian.co.uk/environment/2012/apr/05/chilean-court-patagonia-dam> (accessed on 21 September 2012).